#11

BELHAJ 5 (73-923)

IN THE UNITED STATES
PATENT AND TRADEMARK OFFICE

Declaration of Prior Invention under 37 CFR 1.131

I hereby claim benefit under 37 CFR 1.131 to a showing of facts that establishes conception of the invention described and claimed in U.S. Appl. No. 09/428,468 filed October 28, 1999 entitled "BI-DIRECTIONAL SCAN SWITCH MATRIX METHOD AND APPARATUS" prior to the effective date of U.S. Patent No. 6,417,787, filed on August 24, 1999. I herein claim priority back to October 30, 1998, the date on which I executed an invention submission. Photocopies of this invention submission accompany this declaration.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Full name of the sole inventor: **Said O. BELHAJ**

Inventor's signature _____ Date 3-3-2003

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MICROELECTRONICS PATENT COMMITTEE INVENTION SUBMISSION #11

Name(s) of Submitters	Telephone No:	Loc/Room	Organization	E-Mail Address
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TITLE: Keypad/Switch Matrix Re-Mapping

IP LAW USE
Submission No: 116820
Date Received: 11-2-98
Attorney: John P. Veschi
Rating: Filing Decision:

Problem(s) addressed by the invention:

Push buttons and switches are an integral part of any electronic equipment as the most common and cost effective method for interfacing with the user. However, as electronic equipment become more intelligent, the user interface becomes more complex requiring more push buttons and switches.

Closest known solution:

The most common method for reading the state of push buttons is by arranging push buttons in a matrix of rows and columns. A suitable software algorithm can then be used to scan the matrix and identify individual buttons. Switches are read individually using dedicated inputs.

DESCRIPTION OF THE INVENTION, keyed to drawings, sketches, photographs, etc., sufficient to enable one knowledgeable in the invention's field of technology to understand construction and operation of the invention.

Summary (30 words or less):

The number of push buttons that can be read in a standard keypad matrix is the product of the rows and columns. The invention proposes to double the capacity of a keypad matrix by re-mapping the matrix with a second keypad. The invention further proposes to integrate switches within a keypad matrix.

Detailed Description: (Please attach additional pages if necessary)

The attached Figure 1 shows a 3x3 matrix capable of reading 18 push buttons.

The invention uses reverse scanning to read the second keypad map. In order for reverse scanning to work, both the rows and columns IOs of the controller must be bi-directional. The re-mapped keypad matrix behaves in a similar manner to a standard keypad matrix, including the fact that only one button can be read at any one time.

To read map 1 (key1 – key9):

1) Rows are input and Cols are output.
2) To prevent shorting Rows to Cols, output IOs should not be driven HIGH. Instead, they should be tri-stated by configuring individual outputs as input.
3) Keypad scan is achieved by walking a zero on Cols and reading the value of Rows.

To read map 2 (keyA – keyI):

1) Cols are input and Rows are output.
2) Keypad scan is achieved by walking a zero on Rows and reading the value of Cols.

The other implementation of this invention is the integration of switches in the matrix. Switches can be integrated in both maps 1 & 2. Although not essential, the software scan algorithm changes can be minimized by ensuring that individual columns within the same keypad map have all components (switches/push buttons) of the same type. Figure 2 shows three switches integrated in Col1 of the keypad matrix.

Advantages:

Reduced product cost.

Commercial product(s) or other applications in which the invention may be used:

Any electronic equipment with push buttons and/or switches. Specifically applications requiring numerous push buttons and/or switches such as computer keyboards, TV remote controls, telephone answering devices, cordless/corded telephones, etc..

Explain how use of the invention would be detected:

Review the device's schematic. If the device's schematic shows more than one key connected to the same two signal lines (row and column) then the invention has probably been copied.

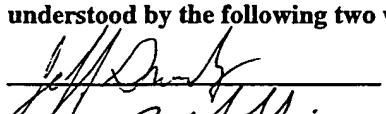
*** Provide the information requested in this box on each page of the submission, as well as drawings, sketches, photographs, etc. ***

Submitter(s) signature(s) and date:

10/30/98
date

date

This invention submission has been read and understood by the following two witnesses:



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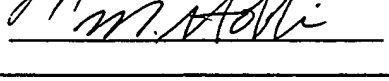

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